

PATENT COOPERATION TREATY

PCT


INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 18 OCT 2005

WIPO PCT

Applicant's or agent's file reference CH920030028	FOR FURTHER ACTION		See Form PCT/PEA/416
International application No. PCT/IB2004/002724	International filing date (day/month/year) 23.08.2004	Priority date (day/month/year) 29.09.2003	
International Patent Classification (IPC) or national classification and IPC H01L21/768, H01L21/027, G03F7/00			
Applicant INTERNATIONAL BUSINESS MACHINES CORPORATION			
1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36. 2. This REPORT consists of a total of 4 sheets, including this cover sheet. 3. This report is also accompanied by ANNEXES, comprising: a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 3 sheets, as follows: <input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). <input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).			
4. This report contains indications relating to the following items: <input checked="" type="checkbox"/> Box No. I Basis of the opinion <input type="checkbox"/> Box No. II Priority <input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability <input type="checkbox"/> Box No. IV Lack of unity of invention <input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement <input type="checkbox"/> Box No. VI Certain documents cited <input type="checkbox"/> Box No. VII Certain defects in the international application <input type="checkbox"/> Box No. VIII Certain observations on the international application			
Date of submission of the demand 28.07.2005		Date of completion of this report 19.10.2005	
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer Ploner, G Telephone No. +31 70 340-4225	



**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/B2004/002724

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-16 as originally filed

Claims, Numbers

1-13 received on 02.08.2005 with letter of 28.07.2005

Drawings, Sheets

1/4-4/4 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing *(specify)*:
 - ☐ any table(s) related to sequence listing *(specify)*:
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing *(specify)*:
 - ☐ any table(s) related to sequence listing *(specify)*:

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/IB2004/002724

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-13
	No: Claims	
Inventive step (IS)	Yes: Claims	1-13
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-13
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

Reference is made to the following document:

D1: US-B1-6 517 995 (Jacobson et al.); 11 February 2003 (2003-02-11)

1.

Claim 1 lacks clarity (Article 6 PCT). In claim 1, the phrase "wherein the aligning comprises stretching the stamp" is considered to be vague in that it does not specify the direction of said "stretching".

In the following assessment of novelty and inventive step it is therefore assumed that said "stretching the stamp" is a lateral stretching resulting from offsetting said protrusions and recesses in said stamp and surface, respectively.

2.

The document D1 discloses a method of forming a multilevel structure by pressing a patterned elastomeric stamp into a curable liquid layer deposited on a surface.

The subject-matter of claim 1 differs from this known method mainly in that the aligning of the elastomeric stamp comprises stretching the stamp.

The document D1 neither discloses nor suggests said step of stretching the stamp during alignment. Consequently, the subject-matter of claim 1 is considered to meet the requirements of Article 33(1) PCT in respect of novelty (Article 33(2) PCT) and inventive step (Article 33(3) PCT).

3.

Claims 2-13 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Revised CLAIMS

1. A method for forming a multilevel structure on a surface (100), the method comprising: depositing a curable liquid layer (180; 200) on the surface; pressing a stamp (120) formed from an elastomeric material and having a multilevel pattern (121, 122) therein into the liquid layer to produce in the liquid layer a multilevel structure defined by the pattern; and, curing the liquid layer to produce a solid layer having the multilevel structure therein,

the method further comprising, prior to the pressing, aligning the stamp relative to the surface via complementary formations on the stamp and the surface, wherein the aligning comprises lubricating movement of the stamp relative to the surface via the liquid layer and wherein the complementary formations comprise protrusions (310, 320) on one of the stamp and the surface and recesses (330, 340) for receiving the protrusions on the other of the stamp and the surface; wherein the aligning comprises stretching the stamp.

2. A method as claimed in claim 1, wherein the protrusions are offset (d) relative to the corresponding recesses to produce the deformation of the stamp.

3. A method as claimed in claim 1 or 2, wherein the depositing comprises depositing an excess of the liquid comprising the liquid layer on the protrusions.

4. A method as claimed in claim 3, wherein the aligning comprises expansion of the recesses in the direction of the offset when brought into contact with corresponding protrusions, the elasticity of the stamp providing an exit path for the excess liquid and allowing each recess to close around a corresponding protrusion.

28 July 2005

5. A method as claimed in any preceding claim, wherein the solid layer is formed from a dielectric material (200) and the multilevel structure comprises a multilevel cavity (195) in the solid layer.

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6. A method as claimed in any one of claims 1 to 4, wherein the solid layer is formed from a resist material (180), the multilevel structure comprises a multilevel cavity (195) in the solid layer, and the depositing comprises
10 depositing the resist material in liquid form on a dielectric layer (140, 160).

7. A method as claimed in claim 6, comprising etching the dielectric layer via the solid layer to transfer the cavity
15 from the solid layer to the dielectric layer.

8. A method as claimed in any one of claims 5, 6 or 7, comprising depositing metal (190) in the cavity to produce a conductive structure embedded in dielectric material.

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9. A method as claimed in claim 8, comprising performing thiol printing on the dielectric layer, thereby to prevent deposition of the metal outside the cavity.

25 10. A method as claimed in any one of claims 5 to 9, wherein the cavity comprises a first level (121) corresponding to a longitudinal element of the conductive structure and a second level (122) corresponding to a lateral element of the conductive structure.

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11. A method as claimed in claim 10, wherein the longitudinal element comprises a via for completing an electrical connection between adjacent levels of a multilevel interconnection structure for an integrated circuit, and the

28 July 2005

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lateral element comprises a wire for completing an electrical connection within one of the adjacent levels of the integrated circuit.

5 12. A method as claimed in any preceding claim, wherein the curing comprises exposing the liquid layer to ultra violet light via the stamp.

13. A method for fabricating an integrated circuit having a
10 multilevel interconnection structure, the method comprising, between at least one pair of adjacent levels of the interconnection structure, forming an electrically conductive structure by performing a method as claimed in claim 11.

28 July 2005

AMENDED SHEET

02-08-2005